Nitrogen & Nutrient Strategies for 2014

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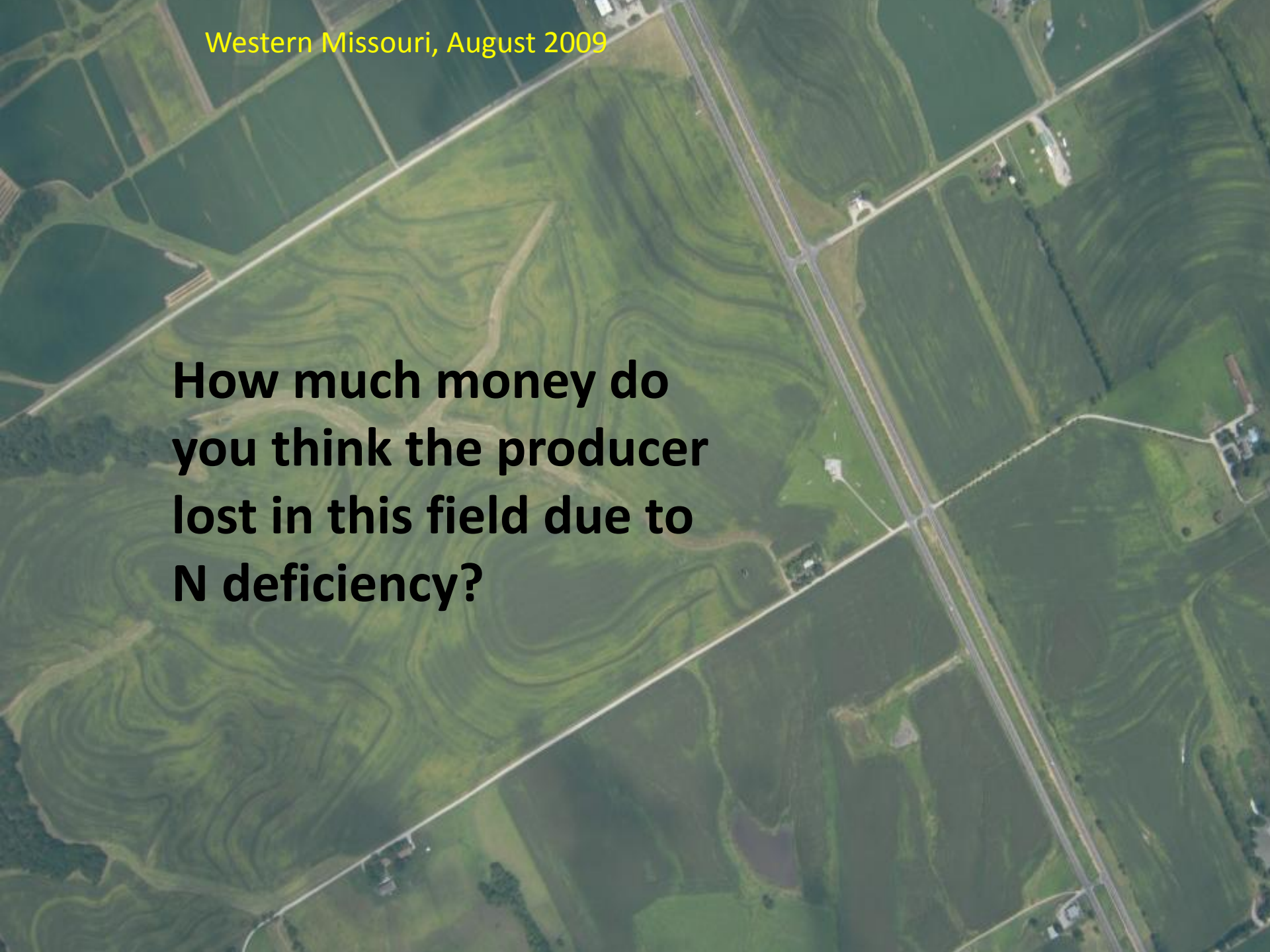
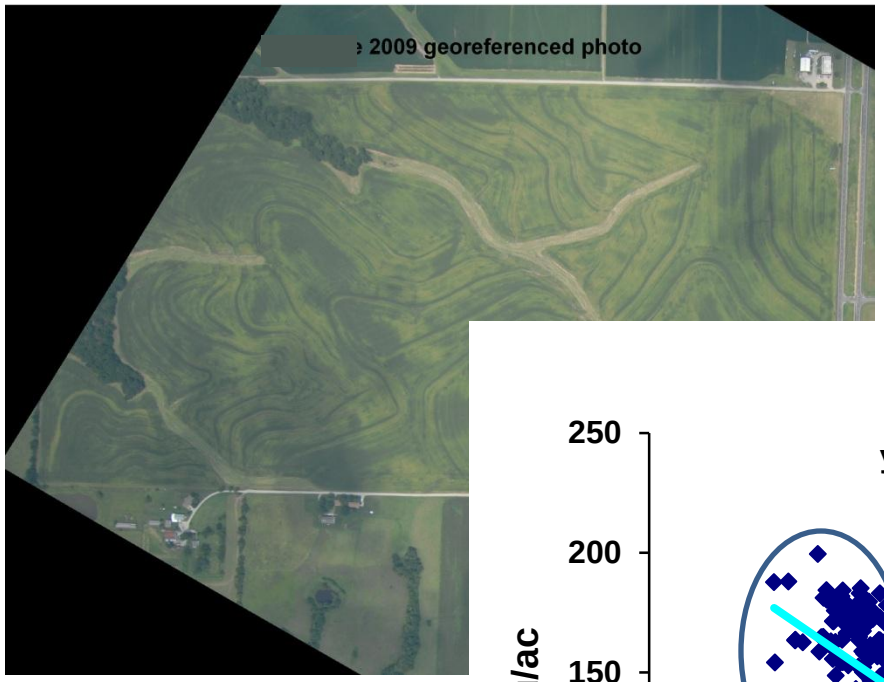
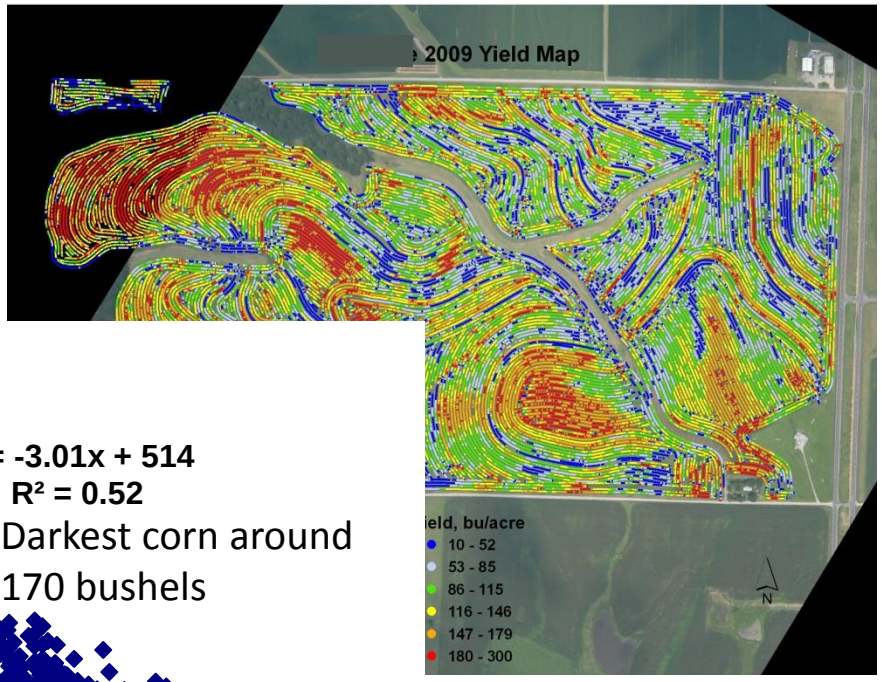
Pioneer Agronomy Seminar
January 9, 2014

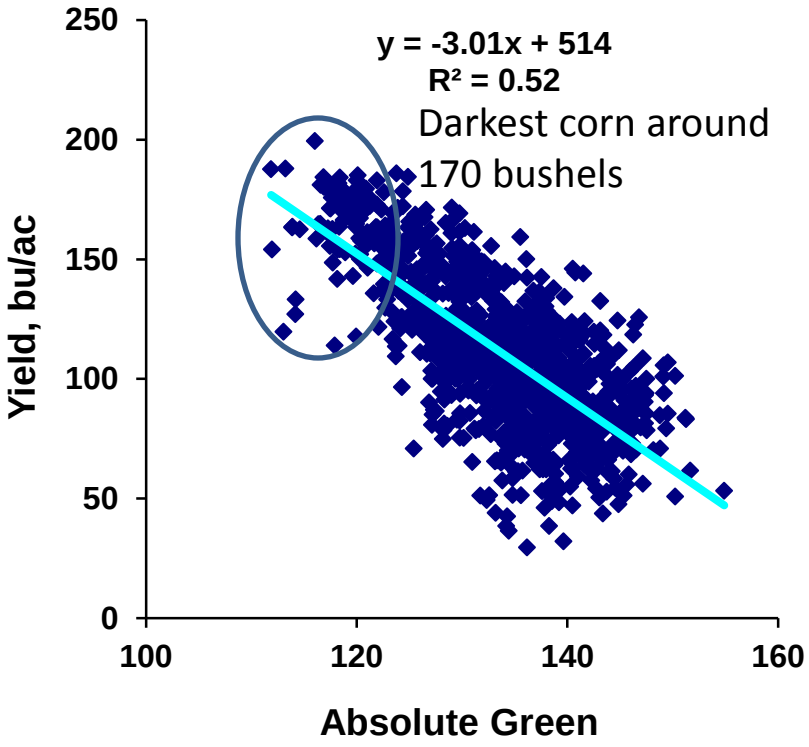

Strategy 1: Don't let your corn look like this
Central Iowa, August 2008


Western Missouri, August 2009
How much money do you think the producer lost in this field due to N deficiency?

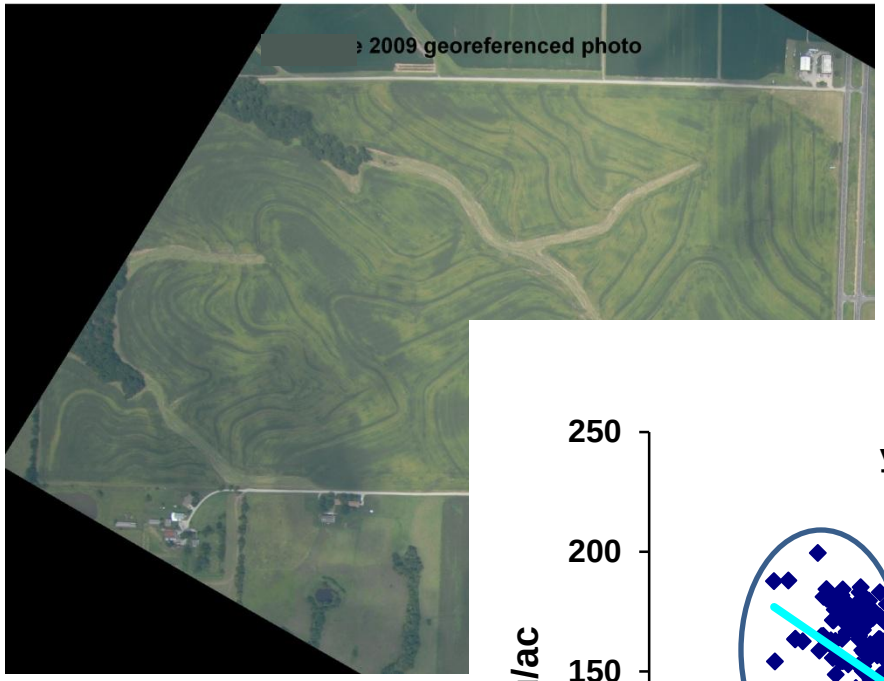
Yield map: yellow corn yielded poorly

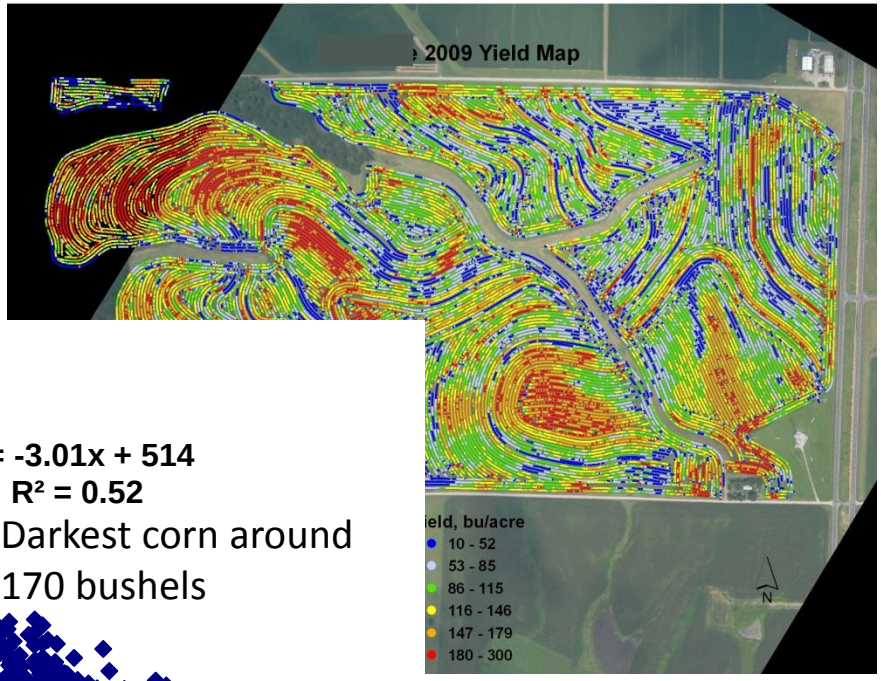


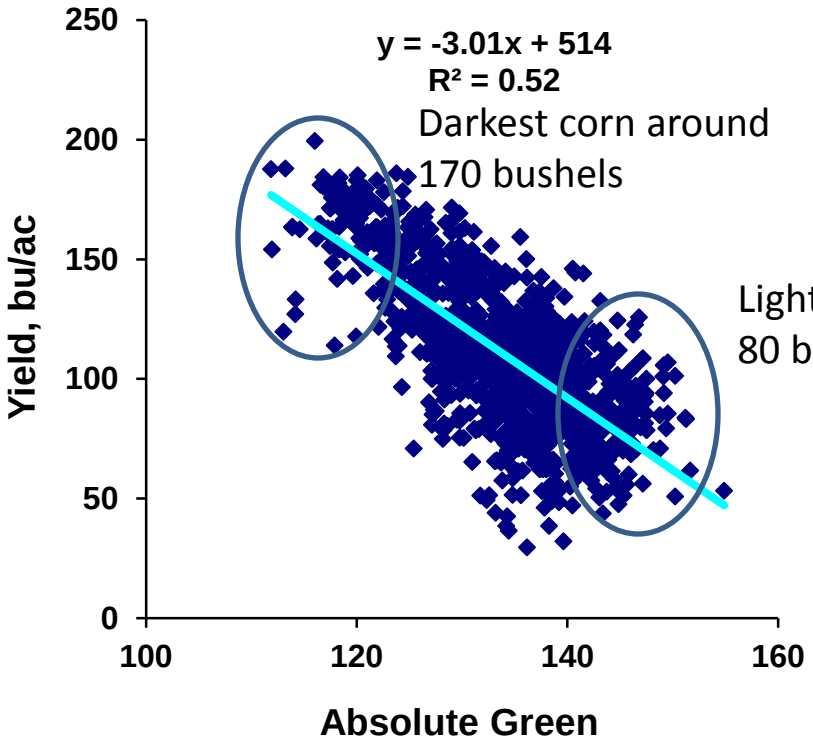




Yield map: yellow corn yielded poorly







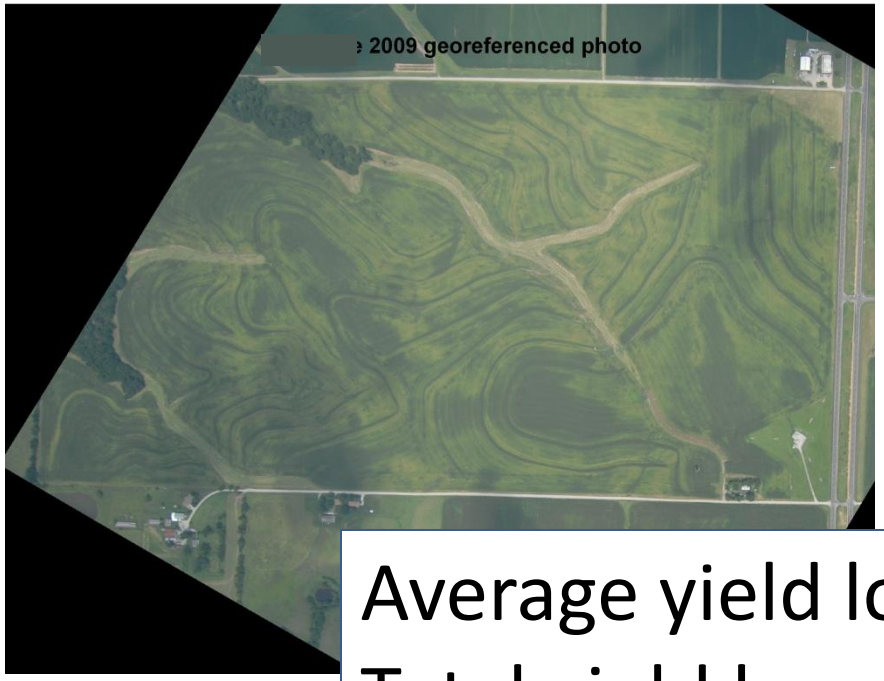
Darkest corn around 170 bushels

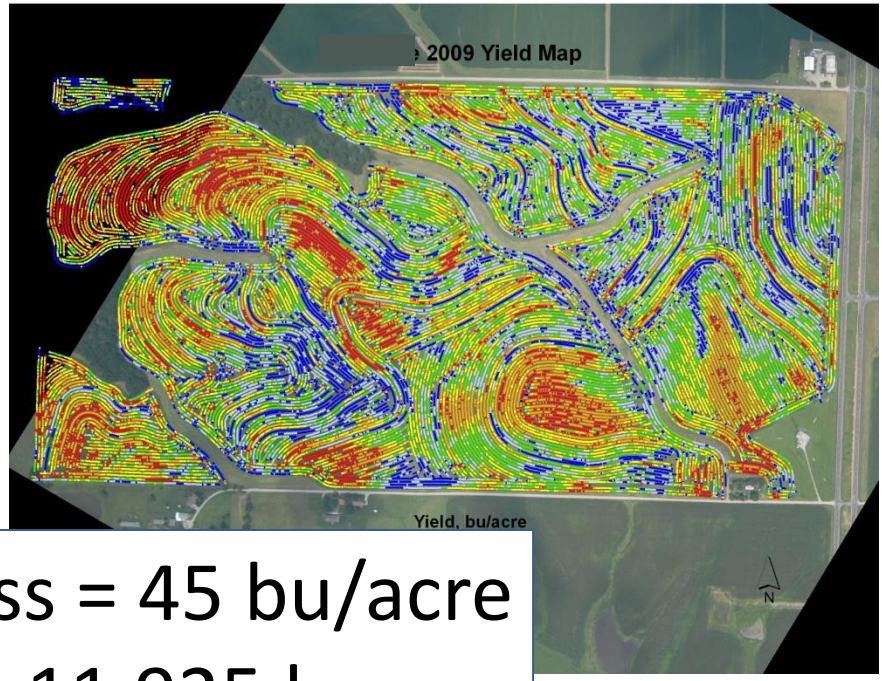
Lightest corn around 80 bushels

Average yield 125 bushels

45 bushels less than dark green corn

N Deficiency costs a lot!





Average yield loss = 45 bu/acre

Total yield loss = 11,925 bu

(45 bu/ac x 265 acres)

Total economic loss = **$44,720**

(11,925 bu x $3.75/bu)

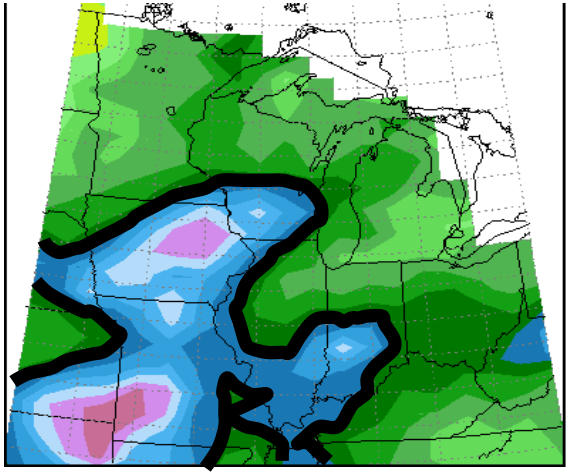

Western Missouri, August 2009
How did this corn get yellow?


Excess rainfall,
April to June

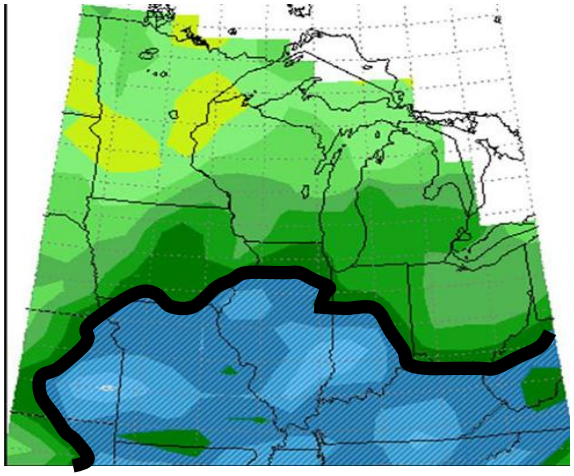
Four wet springs

Outlined areas > 16 inches rain April-June

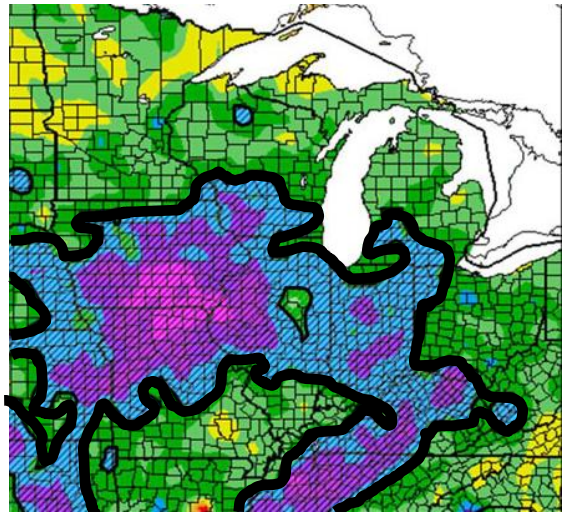
2008



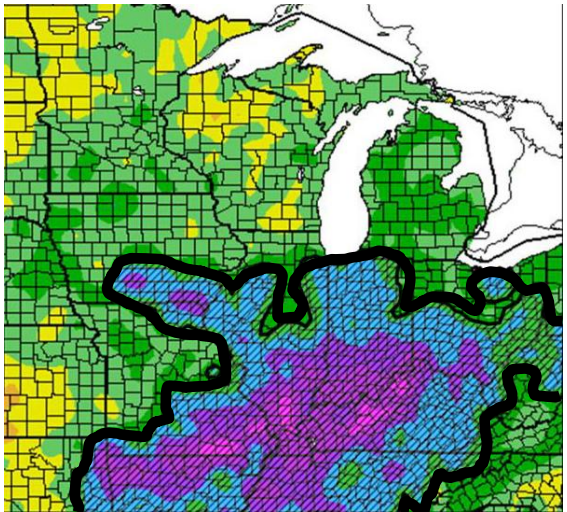
2009



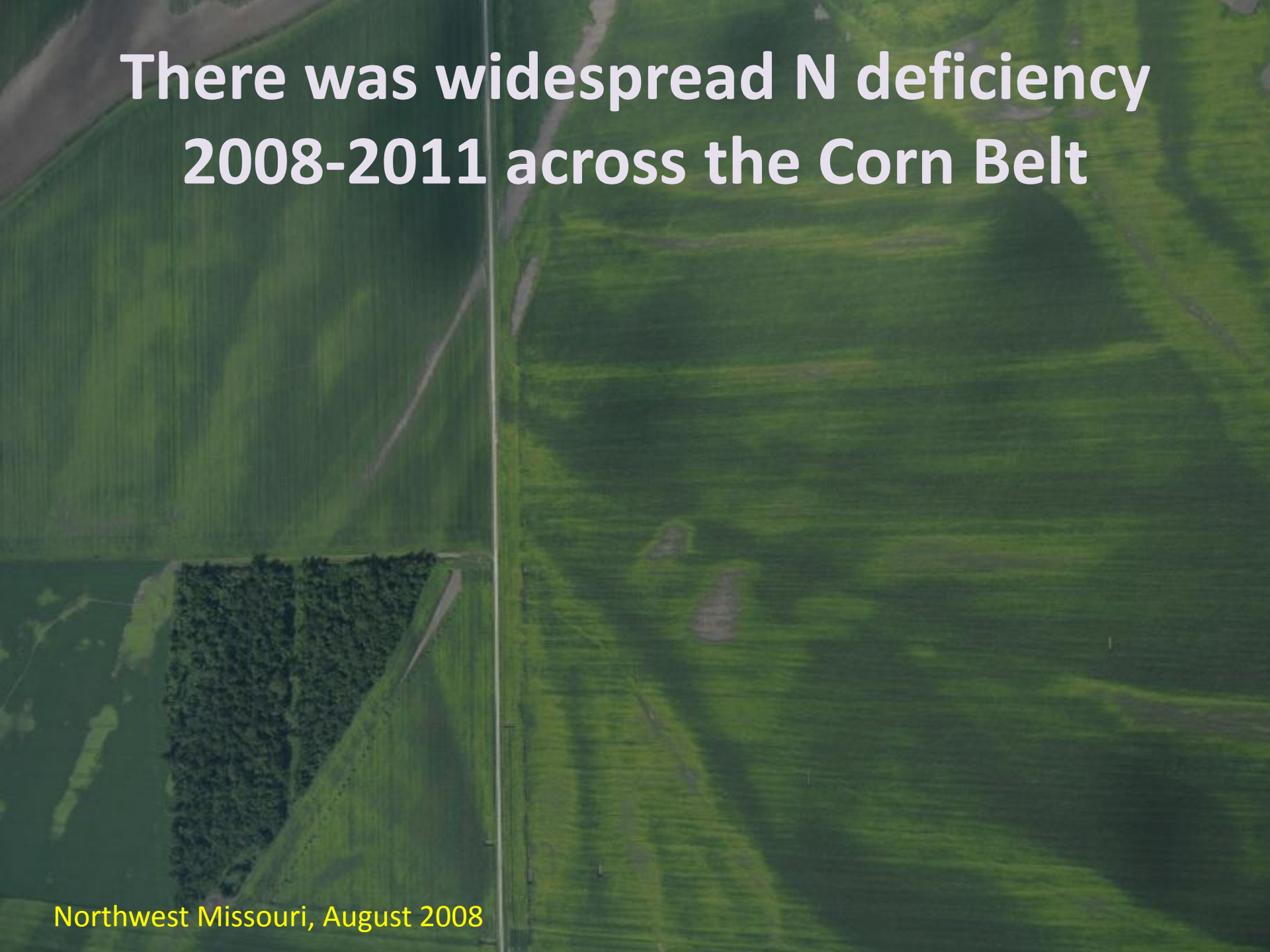
2010



2011



There was widespread N deficiency 2008-2011 across the Corn Belt



Northwest Missouri, August 2008

There was widespread N deficiency 2008-2011 across the Corn Belt

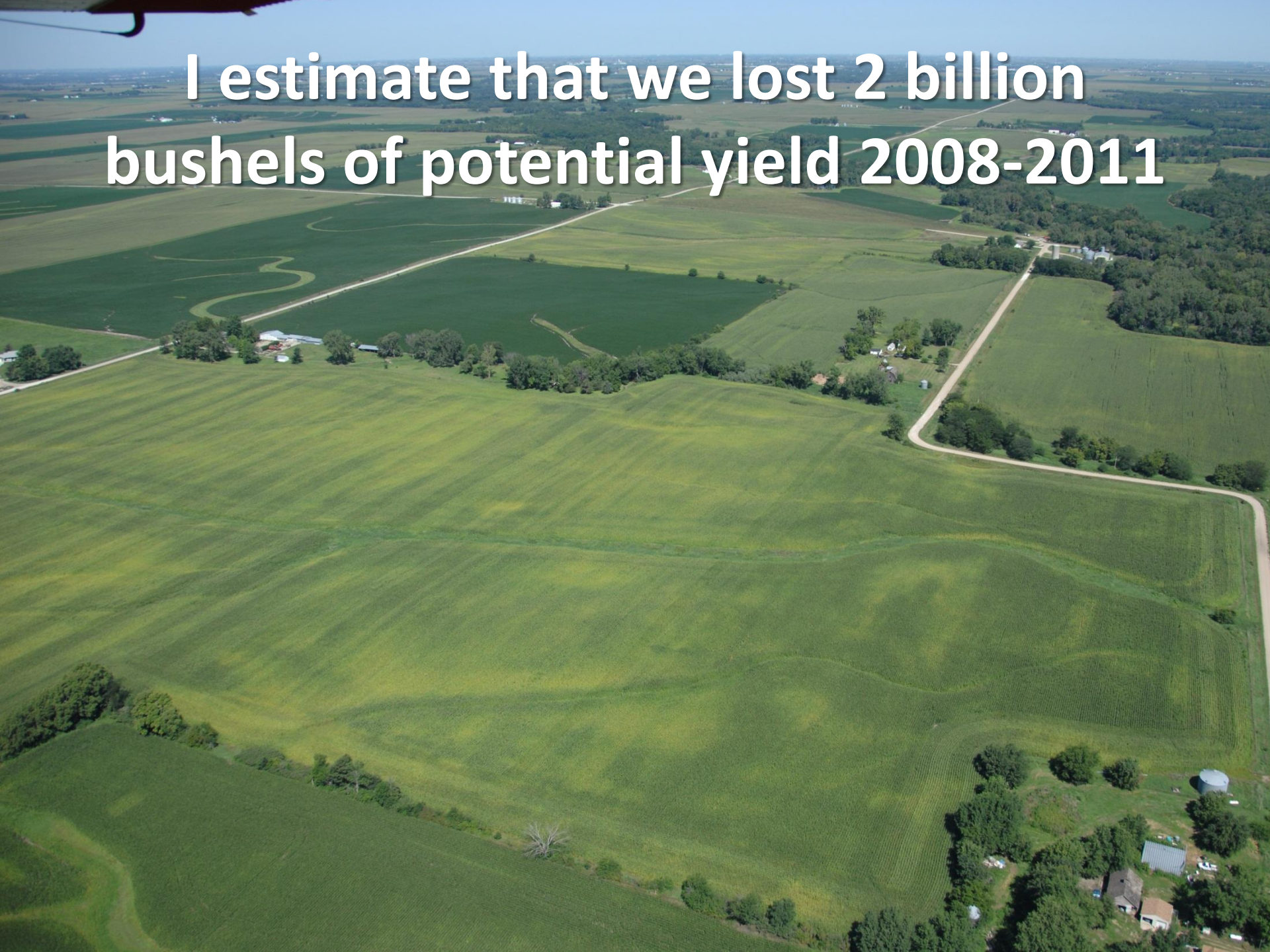
Central Illinois, August 2009

There was widespread N deficiency 2008-2011 across the Corn Belt

Western Illinois, June 2010

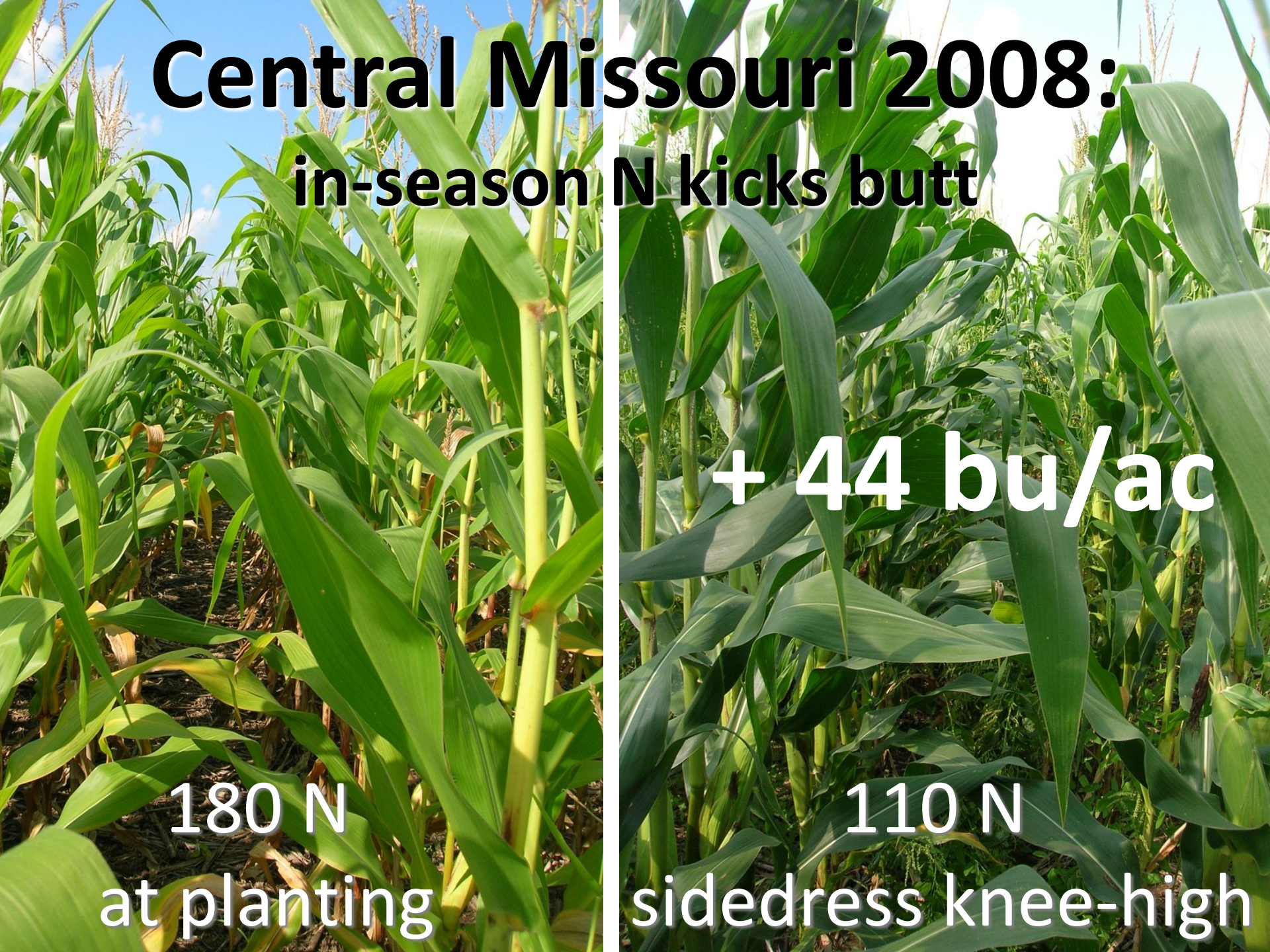
There was widespread N deficiency 2008-2011 across the Corn Belt

Central Iowa, August 2008


I estimate that we lost 2 billion bushels of potential yield 2008-2011


Strategy 1: Don't let your corn look like this
How can you avoid it?
Central Iowa, August 2008


In a wet year,
N must be
applied in-season
How do I know that?
Central Iowa, August 2008


Central Missouri 2008:
in-season N kicks butt
+ 44 bu/ac
180 N
at planting
110 N
sidedress knee-high


Central Missouri 2009:
in-season N kicks butt again
+ 68 bu/acre
153 N sidedress
knee-high
180 N
at planting
153
Post
180
Pre

Central Missouri 2010:
Can you believe a 3-peat?

Central Missouri 2013: N rate & timing

N timing	N rate	Yield
Knee-high	167 (chlorophyll meter)	213
Knee-high	174 (crop sensor, VR 67 to 191)	207
Knee-high	132 (soil nitrate test)	196
Preplant	180	126
Preplant	140	101
Preplant	140 (soil nitrate test)	94
Preplant	100	72
----------	0	51

Sidedress N benefit in this experiment 2007-2013 totals about 260 bushels/acre

All in the wet years: 2008, 2009, 2010, 2013

Wait! What about:

Anhydrous ammonia in April?

With N-Serve?

Or ESN?

Missouri 2013 (wet)
N source & timing

N timing	N source	Corn yield
April	Urea + Agrotain	120

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N timing	N source	Corn yield
April	Urea + Agrotain	120
April	ESN	143

Missouri 2013 (wet) N source & timing

N timing	N source	Corn yield
April	Urea + Agrotain	120
April	ESN	143
April	Anhydrous ammonia	145

N-Serve didn't increase this yield

Missouri 2013 (wet) N source & timing

N timing	N source	Corn yield
April	Urea + Agrotain	120
April	ESN	143
April	Anhydrous ammonia	145
July (waist high)	Urea + Agrotain	162

An all-preplant N program will fail on most fields in a wet year

But a planned all-preplant N program is OK

N lost in wet years can be replaced

Yellow corn can be rescued

- Fully fertilized fields but producers concerned
- N applied anywhere from thigh-high to tassel

Rescue N outcomes

- **Average yield response 34 bu/acre** (11 fields)
- **Yield response depended on visible stress**
  - High stress: 57 bushels (2 tests)
  - Medium stress: 41 bushels (5 tests)
  - Low stress: 14 bushels (4 tests)

Rescue N timing

- **How late is too late?**
  - Six tests in 2010, all applied at tasseling, ave 34 bu response
    - **<u>Tasseling is NOT too late</u>**
  - Give up by 2 weeks after tassel?

How do I know whether I need to apply rescue N?

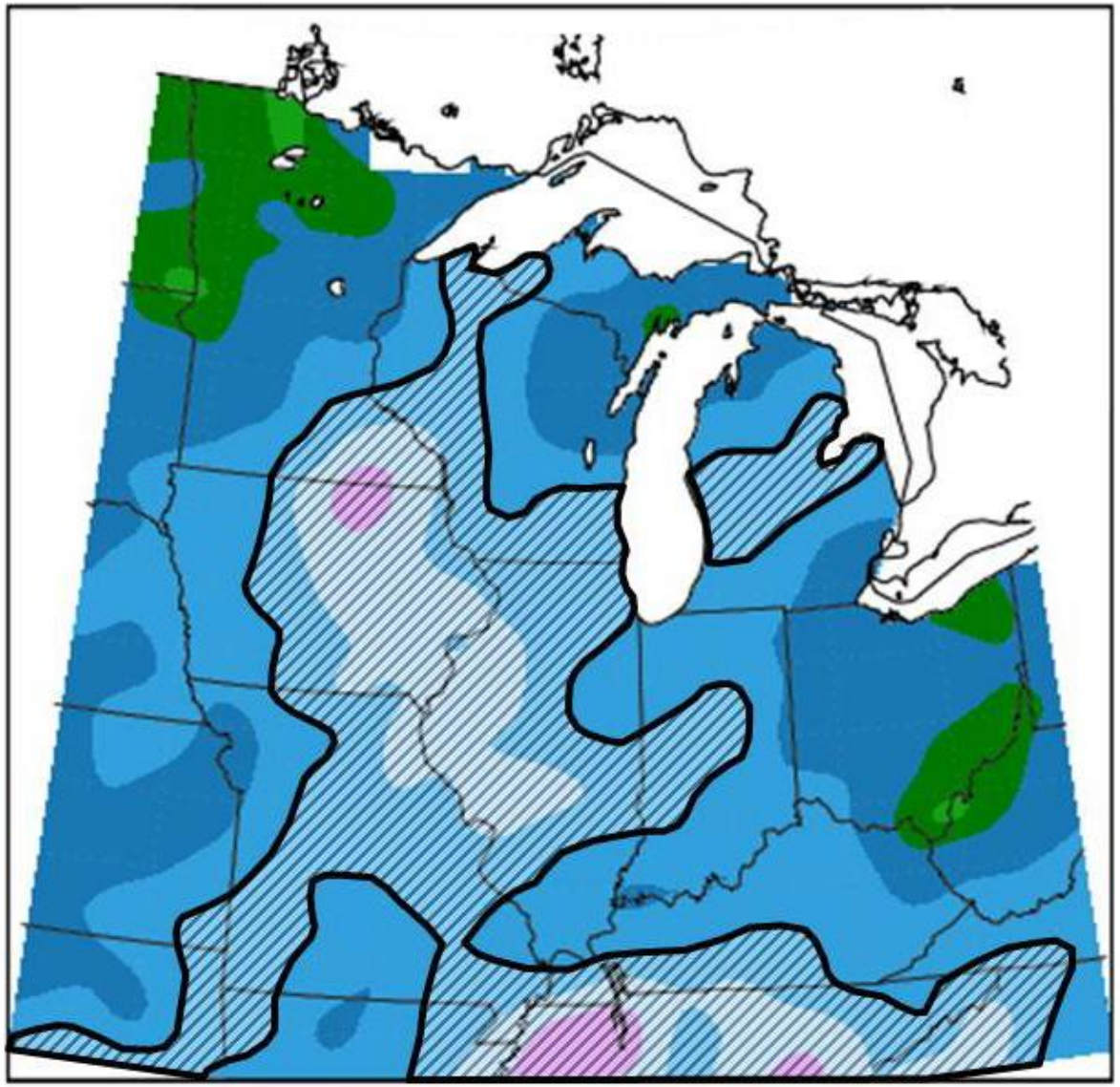
Good question

Has it rained a lot since you made your main N application?

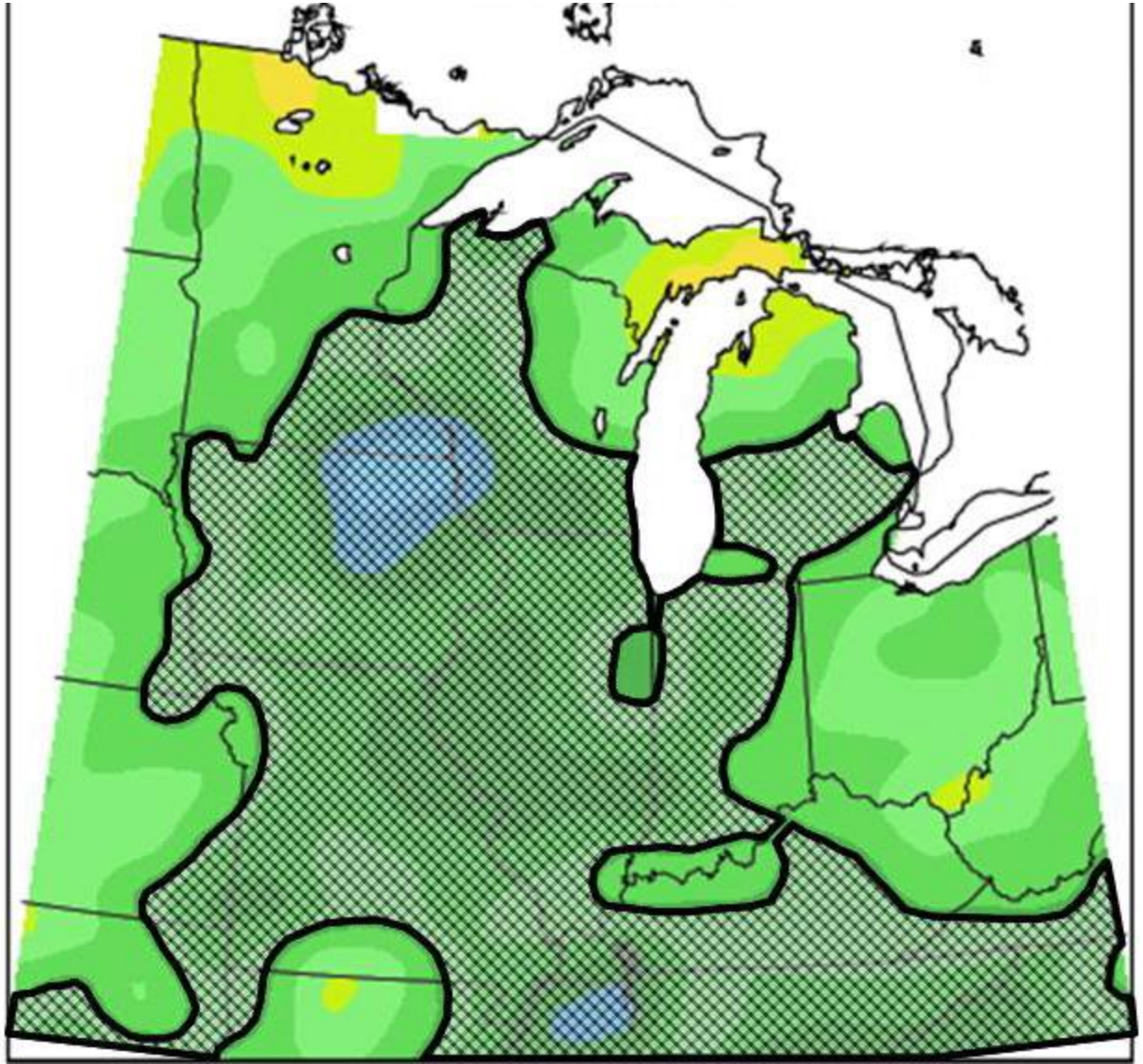
Nitrogen Watch: the first line of defense

- On my webpage
- Shows ‘danger zones’ that are on track for serious N loss
- Based on precipitation maps (from radar)
- Updated weekly until the end of June
- Separate maps for well-drained (leaching) and poorly-drained (denitrification) soils

Nitrogen Watch May 26, 2013



Nitrogen Watch June 30, 2013



OK, I’m in the ‘danger zone’. Now what?

My best answer right now:
Get up in a plane
WITH A CAMERA

But better options are coming

Adapt-N: the second line of defense

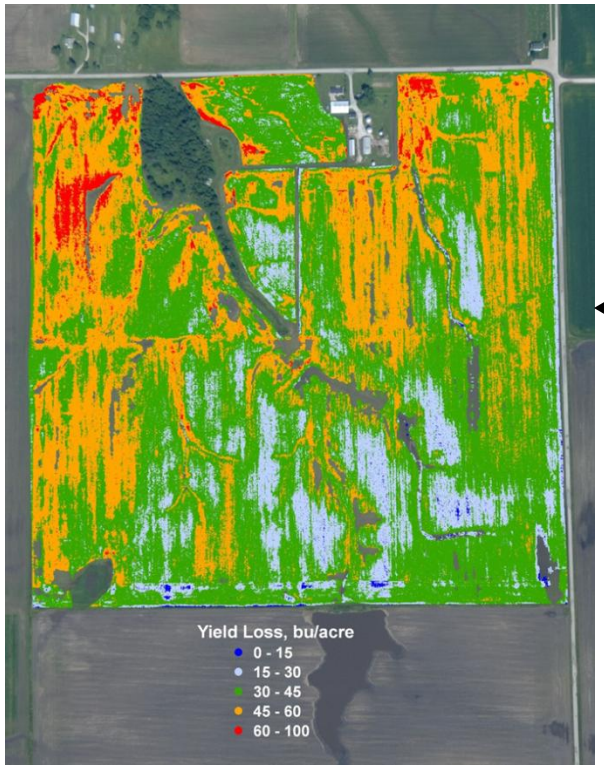
- Computer process model
- Online
- From New York
- Being commercialized right now
- Full commercial release before the growing season
- Quite a few field tests in Iowa with On-Farm Network, successful outcomes I think

Adapt-N: the second line of defense

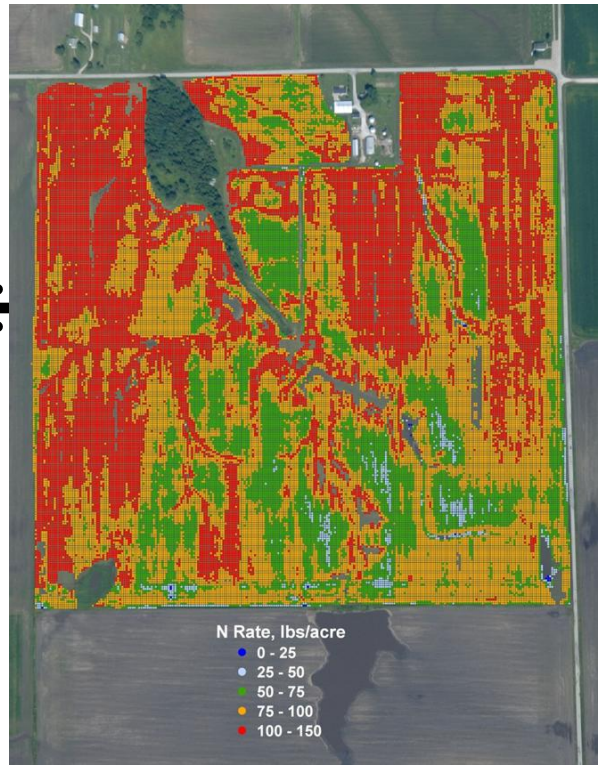
- Uses data on your soils, your N source & timing, your weather
- Requires you to input your soils & management 
- Should get you in the right ballpark
- I don’t think it will reliably predict spatial variability in N deficiency

NVision: the third line of defense

Late June aerial photo



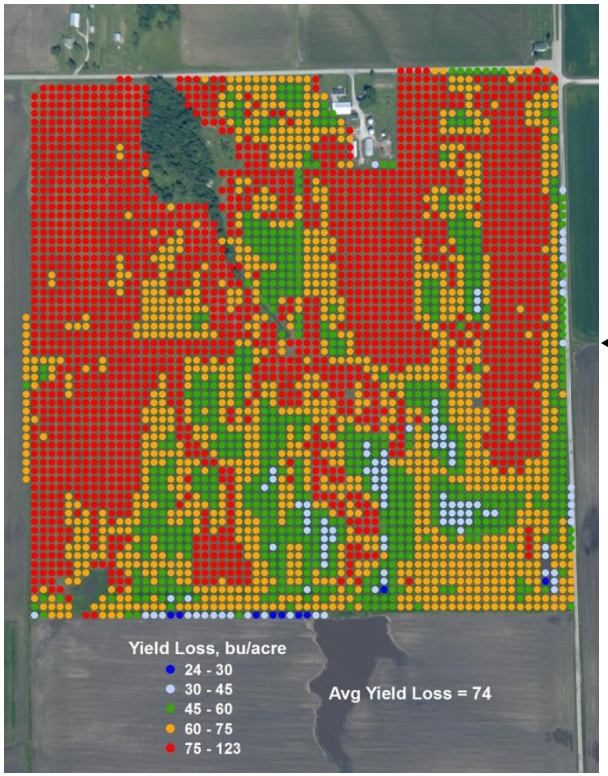
Predicted yield loss (average 41 bu/acre)



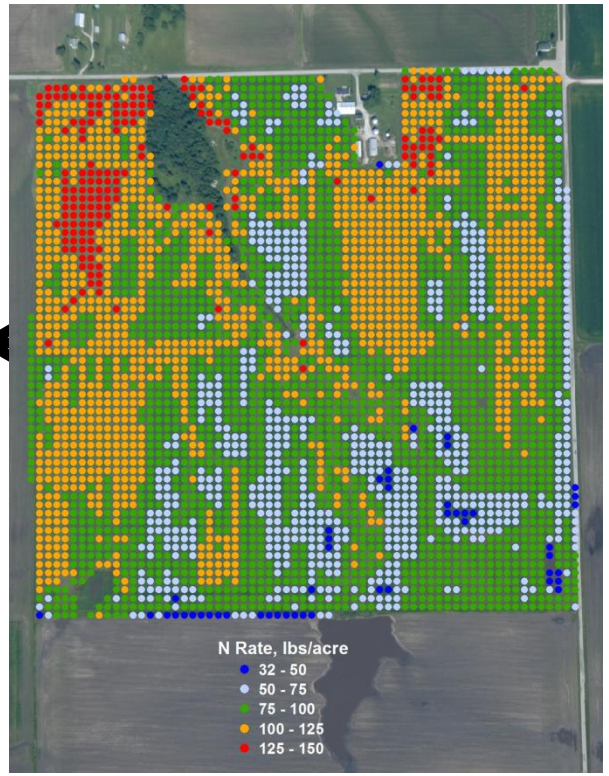
Predicted N need (applicator-ready)

NVision: the third line of defense

aerial photo



yield loss map (ave 74)



N rate map: fix the problem

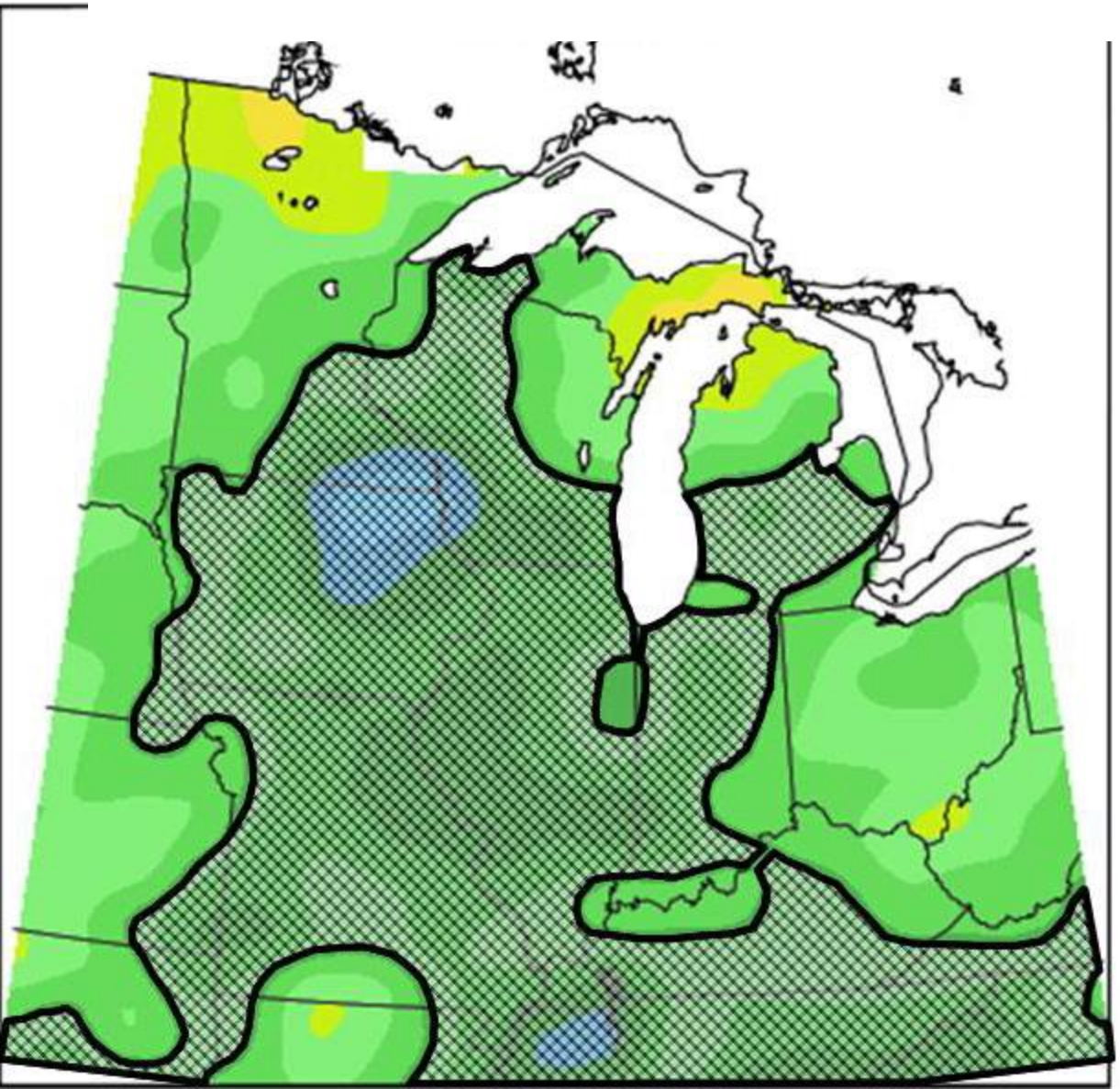
NVision: the third line of defense

- The numbers you need to make the right decision and take the right action
- Patented by University of Missouri (& me)
- I'm working hard to put together the right team (or find the right situation) to launch commercially for 2015
- Better than Adapt-N or other models to manage spatial variability (also more reliable?)

How much do I really need to think about this?

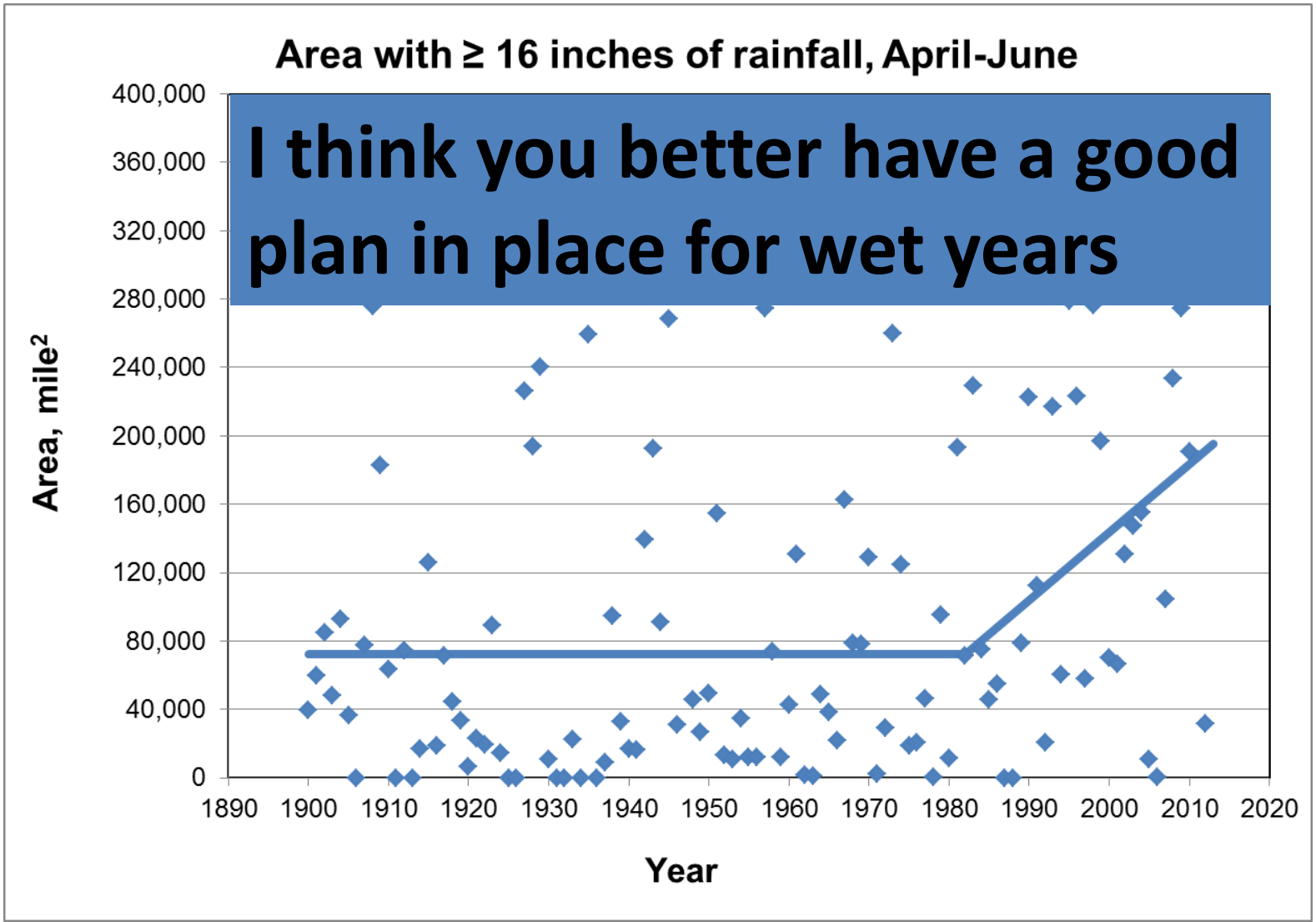
How many wet years are we going to have?

Nitrogen Watch May 26, 2013



We made maps like this for every year going back to 1900

More wet area in the central U.S.



Guess what?

We’re getting there

2013: Far more in-season N than ever before

- Pioneer agronomist webinar June (mainly IA/MO)
  - **On average expected 50% of acres to get in-season N**
- Phone calls July: a dozen consultants, extension agronomists, and retailers in MO/IA/IL
  - **On average thought 45% of acres had received in-season N**
- Field day wagons northwest MO in August
  - 22/63 = **35% of corn producers had applied in-season N**
- **I don't think it had ever been above 5% before**

Shift gears….a little teaser

I think that on-farm testing is the wave of the future for P & K management


Questions?
Comments?
Near Alexander, Iowa
July 22, 2013